Locally Owned Bank Commuting Zone Concentration and Employer Start-Ups in Metropolitan, Micropolitan and Non-Core Rural Commuting Zones from 1970-2010

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Abstract

Access to financial capital is vital for the sustainability of the local business sector in metropolitan and nonmetropolitan communities. Recent research on the restructuring of the financial industry from local owned banks to interstate conglomerates has raised questions about the impact on rural economies. In this paper, we begin our exploration of the Market Concentration Hypothesis and the Local Bank Hypothesis. The former proposes that there is a negative relationship between the percent of banks that are locally owned in the local economy and the rate of business births and continuations, and a positive effect on business deaths, while that latter proposes that there is a positive relationship between the percent of banks that are locally owned in the local economy and the rate of business births and continuations, and a negative effect on business deaths. To examine these hypotheses, we examine the impact of bank ownership concentration (percent of banks that are locally owned in a commuting zone) on business establishment births and deaths in metropolitan, micropolitan and non-core rural commuting zones. We employ panel regression models for the 1980-2010 time frame, demonstrating robustness to several specifications and spatial spillover effects. We find that local bank concentration is positively related to business dynamism in rural commuting zones, providing support to the importance of relational lending in rural areas, while finding support for the importance of market concentration in urban areas. The implications of this research are important for rural sociology, regional economics, and finance.

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INTRODUCTION

In this paper we explore the effects of bank consolidation on local rural economies by estimating a measure of locally-owned bank concentration on the rate of commuting zone (CZ) business start-ups, continuations, and closures. Commuting zones are clusters of counties based on commute-to-work data from the 2000 Census (Tolbert and Sizer 1996). Starting and sustaining a business often requires significant financial backing, especially for individuals who are depending upon the business as a primary source of income. For large business ventures there are many potential financing options, such as publicly traded stock, venture capital/private equity and loans from large financial corporations (see Berger and Udell 1998; Burns 2011). Previous studies indicate that large business lending has been relatively unaffected by mergers and consolidation of firms (see Erel 2011). In rural communities local business ventures are typically smaller, with fewer employees (Walzer, Athiyaman, and Hamm 2007; DeYoung et al. 2012). Such businesses do not typically attract the attention of large venture capital firms (Mencken and Tolbert 2016). These smaller businesses rely on multiple sources of financing, including personal savings, small business loans from banks, credit lines, and even money from friends and family (Craig, Jackson and Thomson, 2007; Valdez 2011; Bird and Sapp 2004). Moreover, Mencken and Tolbert (2016; 2017) show that banks are a more relied-upon form of start-up and expansion capital for business owners in nonmetropolitan economies, compared to similar businesses in metropolitan economies.

The patterns of mergers and acquisitions in the financial sector since the 1980s has led some rural scholars to be concerned about disadvantages for businesses that attempt to start and/or operate in rural locations (see Flora, Flora and Gasteyer 2015; Mencken and Tolbert 2018; Tolbert et al, 2014). Historically, local banks and local businesses formed symbiotic

relationships, which often included practices of 'relationship' lending. Rural economies were no exception (Dudley 1996; DeYoung et al. 2012; Gilbert and Wheelock 2013). The national pattern of bank mergers and acquisitions over the last 25 years has meant a decline in the number of bank firms and an increase in the number of bank establishments. During this same time frame there has been a significant decline in the percentage of locally owned banks in all U.S. counties (Tolbert et al. 2014).

We propose to understand the impact of financial sector consolidation in rural economies by examining the impact of the concentration of locally owned financial institutions on commuting zone business start-ups, continuations, and deaths during the 1980-2010 time period. We examine these effects with non-additive/interaction models with which we differentiate the effects for metropolitan, micropolitan and non-core rural CZs separately. We first begin with a description of financial sector restructuring, a review of the literature and prevailing hypotheses.

Financial Sector Restructuring and Lending

A body of research on the effects of bank consolidation has concluded that any negative consequences were short-term because interstate banking created structural changes in the banking sector in the form of fewer credit constraints. Much of this research has concluded that interstate banking and bank firm consolidation has a) reduced monopolies of inefficient local banks, b) increased efficiency throughout the banking sector, and c) lowered the costs of loans for borrowers (Jayarante and Strahan 1998; Kerr and Nanda 2009; Rice and Strahan 2010; Petersen and Rajan 1995). Proponents of the market concentration perspective argue that consolidation has been good for small and local business lending, bringing larger financial institutions into under-served markets, with more stable loan rates for small businesses (Erel 2011; Vera and Onji 2010; Markley and Shaffer 1993). Historically, small and local banks

were in symbiotic relationships with local, small businesses (Collender and Frizell 2002; Boot 2011). However, economic downturns could severely impact local banking.[1] For example, the farm value bubble burst in the early 1980s led to farm bank failures at rates not seen since the Dustbowl (Calomiris, Hubbard and Stock 1986).[2]

Kashyap and Stein (2000) conclude that interstate banking has been good for small businesses because it synchronized business cycles at the state level. Reductions in the supply of loans or increases in non-loan payments in one state can be off-set by stronger performance in other states. They further argue that any decline in small business lending that resulted from bank consolidation is, at most, a short-term effect. Others propose that the technological expertise that larger banks brought to banking in general (namely credit scoring software) has reduced the costs of processing loans and information seeking (Strahan and Weston 1998; Frame et al. 2001). This has diminished the role of relationship lending and credit rationing for unsecured loans.

Consolidation and market concentration can lead to market monopolies, which can be advantageous for small businesses. In highly competitive banking markets there is less profit to split among many firms, which means fewer loans for small businesses, and especially start-ups (Francis et al. 2008). Consolidation, however, increases market concentration and increases economies of scale. Larger banks can spread loan risks across more assets and are less prone to state and regional economic shocks than small, locally owned and regional banks (Dick 2007; Morgan et al. 2004). Larger banks have more assets and their economies of scale allow them to

[1] Rice and Rose (2016: 69) note that in 2009 the Great Recession led to 139 bank closures and an additional 700 banks placed on the FDIC 'watch list.' Those banks with greater exposure due to holding preferred stock in Fannie Mae and Freddie Mac were most at risk.

[2] The farm value bubble crisis caused the failure of 300 rural farm banks during the 1980s. See "Good times for ag: Will they last?" by Bert Ely American Bankers Association. ABA Banking Journal; Mar 1998; 90, 3; Business Premium Collection.

offer premium services, such as revolving lines of credit, on-line lending, and business credit cards that small banks struggle to provide. Larger banks can also provide loans to small businesses at better rates because there is less risk (Berger and Udell 1995; Erel 2010). Rice and Strahan (2010) find that the proliferation of branch banking has reduced loan rates to small businesses and increased the likelihood that small businesses will use a loan. They find no effect of branch banking and amount of loan secured. From this perspective, a lower concentration of locally owned banks in nonmetropolitan economies may mean more credit is available, which will increase establishment births and continuations, and reduce establishment deaths.

> Market Concentration Hypothesis: There is a negative relationship between the percent of banks that are locally owned in the local economy and the rate of business births and continuations, and a positive effect on business deaths.

Relationship Lending and Local Banking

Financial sector consolidation altered, somewhat, the symbiosis that existed between local businesses and banks. The bank establishment of a larger bank firm (such as Wells Fargo) is less reliant on the local businesses for sustenance. However, the sustenance needs of the local business did not change. Avery and Samolyk (2004) find some support for this argument. They compare the lending patterns of banks consolidated into absentee firms and those consolidated into local community banks and find that small business loan growth flourished in the late 1990s among the later and stagnated among the former. In an analysis of the 2000-2007 time frame, Mencken and Tolbert (2018) find that the concentration of locally-owned banks in a local economy increased significantly the odds that a business was started and/or expanded during that time frame with a conventional bank loan. Moreover, they find that this effect is significantly stronger in nonmetropolitan economies.

Small businesses, and particularly those in nonmetropolitan economies, have tended to rely upon small, locally owned depository institutions (vs. larger, non-local institutions) and their practices of relational (aka. judgment or 'soft' data) lending for financing (Boot 2011; Devaney and Weber 1995; Berger and Udell 1996; Berger and Black 2007; Collender and Frizell 2002). Elyasiani and Goldberg (2004) report that the average length of relationship between a small business and financial institution is 7.7 years. Oftentimes, the loan officer has extensive personal and professional relationships in the community and uses her/his networks to gather additional information about the business from customers and suppliers. This 'embeddedness' also allows the loan officer to consider the personal qualities of the person seeking the loan, such as trustworthiness.

Others have argued that local banks in rural communities use these information networks to know their customers better. According to DeYoung et al. (2012), the rate of default for locally owned rural banks is much lower than the national rate. There are two reasons provided for this finding. First, the networks of information in rural communities allows bankers to know their customers better than data from a portfolio. This allows bankers to reduce loan risk. Second, the social capital of small communities may reduce the risk of default. In the context of their study, to default on a loan is to default on a friend/neighbor (instead of impersonal corporation in an urban setting). This could be very damaging to the community reputation of the business owners, thus making paying off the loan a top priority. Kandilov and Kandilov (in press) find similar results for farm loans. DeYoung et al. (2012) conclude that the relational nature of local rural lending offsets the 'scale' advantages of large absentee firms touted by proponents of the market concentration perspective.

Banks lend money where the potential returns are the greatest. While there are some policy and legal lending requirements intended to minimize this effect (e.g., Small Business Association guarantee lending; Community Reinvestment Act of 1977; Gramm-Leach-Bliley Act of 1999 provision allowing small bank access to Federal Home Loan Banks), places with higher risks and less promising returns may not attract capital from larger, non-local banks as easily (Kilkenny 2002; Shaffer and Collender 2008). Without the symbiotic relationship between banks and local businesses, many small local businesses may struggle to find conventional financing. These local businesses and their host communities may suffer because of the loss of long-standing relationships with the local bank, or because they cannot use their community reputations to secure credit for a start-up business. In either event, this could lead to slower growth of new businesses, less sustainability, and more business deaths.

The literature review of financial restructuring and the importance of local banks for small-business start-up and expansion loans in rural economies leads to the following hypothesis:

> Local Bank Hypothesis: There is a positive relationship between the percent of banks that are locally owned in the local economy and the rate of business births and continuations, and a negative effect on business deaths.

DATA AND METHOD

Methods

This analysis uses three measures of local business dynamics and growth as dependent variables: (1) establishment births; (2) establishment deaths; and (3) establishment continuers. Specifically, we use the *share* of employer establishments in a commuting zones (CZs) that are births, deaths, or continuers. To examine these hypotheses, we propose a series of panel and spatial panel regression models using annual CZ-level data from 1980 to 2010 as the unit of analysis. We regress establishment births, deaths, and, continuers (in separate regressions) on the

interaction between the percent of CZ banks that are locally owned and indicator variables for metropolitan, micropolitan, and noncore (rural) CZs.

The regressions move past the standard regional economics approach of lagging values of all independent variables, because simply lagging the explanatory variables requires the main identifying assumption is the lack of temporal dynamics in potentially omitted variables, which is implicit in the use of lags (Bellemare, Masaki, and Pepinsky 2017). Thus, implicit in such an approach is that if unobservables at time $t-10$ are causally associated with unobservables at time t. Hence we estimate a difference equation, such that we regress $y_{t+10} - y_t$ on x_t. This approach assumes that future growth rates of the dependent variables do not affect current levels of explanatory variables and is common in the literature (Levine, Loayza, and Beck 2000; Lobao et al. 2016). To further support this endeavor, we use long lags of 10 years and test both the effect of future levels and the future growth over those 10 years. The model measures all independent (right-hand-side) variables at the beginning year, which includes the years between 1980 and 2000, and all dependent variables are the future levels or growth over the respective future 10 years between 1990 and 2010. This approach allows us to compare one set of regressions that uses annual data (1980-2010), which are displayed in tables 2 and 4, with another set of regressions that uses decennial data (1980, 1990, 2000, and 2010), which are displayed tables 3 and A1-A3. We use the decennial data regressions to test the robustness of the results to the inclusion of additional control variables often found in regional growth literature to account for local and neighboring conditions, which are only available in decennial years. We include standardized CZ population in all regressions, as it is one of the few control variables available annually over the time period under consideration.

Commuting zone data represents an improvement over county-level data in which the units result from arbitrarily drawn political boundaries, rather than logically drawn economic boundaries. Further when modeling effects on small geographic regions like counties, spatial spillover effects are likely (Rey and Montouri 1999; Rupasingha, Goetz, and Freshwater 2002; Rey and Janikas 2005). Such effects are common in regional growth literature and would at best leave the regression inefficient, and at worst bias the results (LeSage and Fischer 2008).

In the context of this article, even using CZ-level data, there are concerns of spatial spillover effects in both independent and dependent variables. For example, a bank may influence the birth or death of an establishment in an adjacent CZ if that establishment uses the bank as a closer alternative to banks in its own CZ. If this is the case, standard CZ-level panel model results may understate or overstate the effect of local ownership of banks by omitting the spillover effect. Spillovers in the dependent variable may also be a concern, as adjacent births/deaths may influence local births/deaths directly through industrial cluster effects or as a proxy for regional economic trends.[3]

Following the suggestions of LeSage and Pace (2009) and Elhorst (2010), we first estimate the more general fixed effects Fixed Effects Spatial Durbin Model (FE SDM), given in equation (1), where W is a contiguity spatial weighting matrix.[4] Then, we test the restrictions imposed Fixed Effects Spatial Auto-Regressive model (FE SAR) and Fixed Effects Spatial Error

[3] While one could conceivably control for some spatial relationships with a fixed effects model, there are logical spillover effects from a locally owned bank (i.e. an establishment may simply use a locally owned bank in an adjacent CZ); and it may be important to account for and quantify the extent to which these spatial effects influence estimates of the effects of local ownership of banks.

[4] The estimates are robust to banded inverse-distance specifications of the weighting matrix. Given LeSage and Pace (2014) label the argument that "estimates and inferences from spatial regression models are sensitive to particular specifications used for the spatial weight structure" as "The Biggest Myth in Spatial Econometrics," and find no support for such an argument, we favor a contiguity matrix for sake of easing interpretation. Further, following Elhorst (2014), it is common practice to normalize W such that the elements of each row sum to unity for ease of interpretation. Since W is nonnegative, normalization ensures that all weights are between 0 and 1.

Model (FE SEM). Specifically, if $\theta = 0$ and $\rho \neq 0$, the model collapses to SAR, while if $\theta = -\beta\rho$, then the model is a SEM. χ^2 test results are given under each regression column and do confirm the statistical significance of spatial spillover effects in both the dependent and independent variables (indicating that the SDM is generally preferred to the SAR and SEM models).

Finally, we must use information criteria to test FE SDM against FE SAC (FE SAR with spatially autocorrelated errors), given in equation (2), because they are nonnested.

(1) $$y_{it} = \rho W y_{it} + \beta X_{it} + \theta W X_{it} + \alpha_i + \gamma_t + u_{it}$$

(2) $$y_{it} = \rho W y_{it} + \beta X_{it} + \alpha_i + \gamma_t + v_{it}$$

$$v_{it} = \lambda W v_{it} + u_{it}$$

The information criteria comparison indicates a small preference towards FE SDM in most cases and thus we focus on the FE SDM results here, though the results of the many spatial models are qualitatively similar. There are additional benefits of using the FE SDM, such as controlling for the influence of omitted variables, and thereby mitigates the need to instrument for endogenous variables (Brasington and Hite 2005).

Data

The key independent variable of interest in the regressions is the share of traditional banking establishments in a CZ that are locally owned. The dependent variables that we use to measure business dynamics include the share of CZ employer establishments that are births (new establishments), deaths (the final year of an establishment), and continuers (establishments existing in the previous year). We create these measures from limited access and near-

comprehensive Longitudinal Business Database (LBD), accessed in a FSRDC. We merge in numerous publicly available control variables common to regional analysis, also detailed in Table 1. Note that, though we include a 3-category multinomial to cover rurality, our spatial panel models controls for the metro status of the adjacent CZ as well, in effect giving us a more detailed control similar to the 9-category USDA Rural-Urban Continuum Codes.

[*Table 1. about here*]

Table 1 also summarizes variables drawn from Decennial Census. We use these additional control variables in a regression that only uses the decennial years (shown in table 3). This regression serves as a robustness check because it is also able to include control variables that are only available from the Decennial Census. The additional variables are common in regional growth and migration literature: percent of people who have a bachelor's degree or higher as a proxy for human capital; rurality (Deller et al. 2001; Wu and Gopinath 2008; Rupasingha, Liu, and Partridge 2015) and percent of individuals that are Black, Asian, and Hispanic as a proxy for relative structural inequalities related to race or ethnicity, and location (Voss et al. 2006; Lobao et al. 2016); and unemployment and poverty rates as proxies for the aggregate strength of the local labor market (Partridge and Rickman 2006; Lobao et al. 2016). Table 2 uses every year of data from 1980 to 2010, but we also include the results found when using only decennial data and more extensive controls in table 3. Table 4 also uses every year of data from 1980 to 2010 and contains the Spatial Durbin Model results. Tables A1-A3 contains the spatial model results using the decennial data. The effects found using only decennial years and more extensive controls are larger, but remain generally the same in terms of sign and statistical significance. Thus, we focus on the results using annual data, rather than decennial data to err on the side of conservatism.

RESULTS

Panel Regressions

This section begins with some Fixed Effects (FE) panel regressions. As noted in the methods section, measures of business dynamics, such as establishment births and deaths, may depend on important and hard-to-observe characteristics of the local economy and geography that correlate with socioeconomic measures. With the Hausman test indicating significance of time-invariant fixed effects, we focus on the FE regressions, controlling for time-invariant CZ unobserved characteristics. The POLS regressions control for these unobserved effects to the extent to which they are determined by metropolitan, micropolitan, and noncore status. The dependent variables in Table 2 are the 10-year growth ($y_{t+10} - y_t$) in establishment (1) births, (2) death, and (3) continuers. Table 2 uses every year of data from 1980 to 2010. We also conducted analysis using only decennial data and more extensive controls. The effects found using only decennial years and more extensive controls are larger, but remain generally the same in terms of sign and statistical significance. These separate results are available upon request.

[*Table 2. about here*]

Table 2 is the first examination of the stark effect of the decline of local ownership of traditional banking institutions in rural versus metropolitan areas. The results indicate that a 1 percentage point increase in the share of metropolitan CZ banks that are locally owned decreases the growth in establishment births by 0.06 percentage points, on average. The interaction between metropolitan status and local ownership, however, indicates a larger and opposite effect in non-core/rural areas. Specifically, a 1 percentage point increase in the share of noncore/rural CZ banks that are locally owned *increases* the change in establishment births in that CZ by 0.005 percentage points, on average. Column (3) indicates that a 1 percentage point increase in the share of metropolitan CZ banks that are locally owned increases the growth establishment continuers by 0.05 percentage points, on average. However, a 1 percentage point increase in the share of noncore/rural CZ banks that are locally owned slightly *decreases* the

establishment continuer growth in rural CZs. In all of these regressions, the effect of local ownership of banks appears to be somewhat of an in-between case for micropolitan CZs.

Tables 3 contains the same regressions, but uses only the decennial years to allow for the addition of control variables. These tables again highlight an opposite effect of the local ownership of banks between metropolitan and noncore CZs. Specifically, Table 3 shows a significantly larger negative effect of local ownership in metropolitan CZs on deaths, and a smaller negative effect in noncore CZs.[5] To summarize our panel regression results, in rural/noncore CZs, local ownership of banks generally increases local establishment births and deaths, and decreases continuers, while having the opposite effects in metropolitan CZs.

[*Table 3. about here*]

Spatial Panel Regressions

As we note in the methods section, there are concerns of spatial spillover effects in both independent and dependent variables. Put simply, a bank may influence the birth or death of an establishment in an adjacent CZ because that establishment simply uses a closer bank in an adjacent CZ. If this is the case, standard panel model results may understate the effect of local ownership of banks by omitting this spillover effect. Table 4 present the average direct effect, average indirect (spillover) effect, and average total effect, all of which have the conventional (marginal effect) interpretation in their respective directions (LeSage and Pace 2009).[6]

[*Table 4. about here*]

The FE SDM direct effect estimates of the impact of locally owned banks are nearly identical to the FE panel models previously discussed, while the indirect effects are mostly insignificant, indicating the use of CZs are generally effective for capturing spillovers. Neighboring CZ population, however,

[5] The change in the coefficients on locally-owned bank concentration appears to be largely due to the change in sample, rather than the additional control variables. The coefficients remain similar when omitting the control variables, but only using the decennial years of data.

[6] The SDM results using only the decennial years and additional controls are left to the appendix in table A1-A3.

remains significant in the regressions. Table 4 shows that though insignificant, the indirect effects of local ownership do increase the total estimated effect of locally owners banks. In a metropolitan CZ, for example, the estimated direct effect of a 1 percentage point increase in the local ownership of banks is a reduction by 0.15 percentage points in future establishment births. Noncore CZs exhibit the same pattern, but with a much smaller effect. The estimated direct effect of a 1 percentage point increase in the local ownership of banks for a noncore CZ is increase by 0.006 (-0.046 + 0.051) percentage points in future establishment births. The total estimated effect however, which included the indirect effect for local ownership in a noncore CZ becomes -0.03. Note that one can interpret the indirect effect estimates in either direction. That is, the indirect effect can be interpreted as either the combined effect of all neighboring CZs on a particular CZ, or the combined effect of a particular CZ on all adjacent CZs (LeSage and Pace 2009). In the context of this article, either interpretation is sensible. Local ownership of local banks in a particular CZ affects neighboring CZs' business dynamics, and local ownership of local banks in neighboring CZs affects a particular CZ's business dynamics.

CONCLUSION

The results from our analysis find support for both hypotheses presented above. Rural communities were concerned that the loss of local banks would affect access to small business lending in rural communities by linking conventional loans more tightly to hard data credit scoring. Traditionally, these communities have relied upon conventional banking loans from local banks at a greater rate than comparable businesses in urban areas (Mencken and Tolbert 2016; 2018). A sizeable volume of research on this topic in the field of finance concedes that consolidation in the financial sector at the national level will lead to a reduction of relationship lending, particularly for small businesses in locales where market concentration is not achieved (Berger and Black 2011; Berger et al. 2005; Berger and Udell 2002; Brevoort and Hannan 2004). The lack of local ownership of financial institutions could mean less access to conventional capital for local businesses in rural communities (DeYoung et al. 2012).

The results for our model shows that between 1980 and 2010, a period that covers the significant consolidation of the financial sector at the level of the firm, new business growth was greater in noncore/rural CZs, compared to metropolitan and micropolitan CZs, which had greater concentrations of locally owned banks. Based on previous research (see DeYoung et al, 2012; Elyasiani and Goldberg 2004; Avery and Samolyk 2004), we expect that the practice of relationship lending between local banks and local businesses was one of the key reasons for the greater growth rates of business start-ups. While this finding and conclusion would support the relational lending/local banking hypothesis, it is still conjecture at this point in time. We do not have data on the nature of relationships between local business growth and local banking. What we have at this point is a reasonable expectation, based on theory and previous research, and a significant statistical correlation over time, which is robust over a variety of different model types.

The data also show support for the market concentration hypothesis. In metropolitan CZs, a higher concentration of non-local banks (and presumably branches of larger banks) has a positive effect on new business growth. We maintain that this finding supports the market concentration benefits from the consolidation and restructuring in the financial services sector. In urban areas the competitive rates and volume of lending lead to a greater supply of available start-up capital. This leads to greater growth. In line with this finding is the expected negative effects of non-local banking on business deaths in metropolitan CZs. Non-local banks rely more on hard-data and credit scoring to process loan applications. It is expected that these lead to fewer business deaths because of better information and reduced risk. Our data show that this is clearly the case in metropolitan CZs.

Our findings are also at odds with the predictions of the relational lending/local banking hypothesis. DeYoung et al (2012) speculate that bank failure rates are lower in rural communities because banks in these geographies are more likely to use the information embedded in the relationship networks throughout the community in the process of making the loan decision. Based on this logic, we expected to find that there would be slower death rates in CZs with a higher proportion of local banks. We find the opposite. One interpretation of this is to conclude that the market concentration perspective applies well to business sustainability and survival in all CZ types, while the relationship lending/local bank hypothesis applies well to business start-ups in rural economies. The applicability of each theory is contingent upon both geography and location in the business life cycle.

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Table 1. Commuting Zone Descriptive Statistics

Variable	Mean	Std. Dev.
Local ownership	32.41	23.19
Births share	9.44	3.28
Deaths share	8.60	1.72
Continuers share	81.97	3.89
Population	5,143,000	13,400,000
Bachelor's degree percent	10.66	4.48
Poverty percent	15.24	5.78
Black percent	7.99	12.15
Asian percent	3.17	4.97
Hispanic percent	6.89	12.52
Unemployment rate	6.87	2.94
Metropolitan	0.16	0.36
Micropolitan	0.37	0.48
Rural/Non-core	0.47	0.50

Note: publicly available data summary statistics are estimated externally, rather than with matched observations in the Federal Statistical Research Data Center

Table 2. Fixed Effects Panel Regressions Using Annual Data 1980-2010

	(1) Births Growth	(2) Deaths Growth	(3) Continuers Growth
Local ownership	-0.0598***	0.0054	0.0544***
	(0.0116)	(0.0048)	(0.0106)
Local owned and micro	0.0450***	-0.0027	-0.0423***
	(0.0101)	(0.0045)	(0.0091)
Local owned and noncore	0.0653***	-0.0058	-0.0595***
	(0.0106)	(0.0045)	(0.0098)
Standardized population	1.940***	-0.6546***	-1.285***
	(0.5572)	(0.1312)	(0.4658)
Constant	10.08***	-3.317***	-6.767***
	(0.4995)	(0.1491)	(0.4732)
Observations	~15,000	~15,000	~15,000
R-squared	0.4881	0.3416	0.4273
Year FE	YES	YES	YES

Robust standard errors in parentheses
*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table 3. Fixed Effects Panel Regressions using Decennial Data 1980-2010

VARIABLES	(1) Births Growth	(2) Deaths Growth	(3) Continuers Growth
Local ownership	-0.2695***	0.0349***	0.2345***
	(0.0454)	(0.0108)	(0.0389)
Local owned and micro	0.1411***	-0.0119	-0.1292***
	(0.0364)	(0.0098)	(0.0304)
Local owned and noncore	0.2163***	-0.0221**	-0.1942***
	(0.0394)	(0.0105)	(0.0334)
Standardized population	5.406***	-0.3813	-5.024***
	(1.197)	(0.3805)	(1.2298)
Bachelor's degree percent	0.8516***	-0.2371***	-0.6145***
	(0.1720)	(0.0482)	(0.1526)
Poverty percent	0.2358	0.0629*	-0.2987*
	(0.1742)	(0.0363)	(0.1530)
Black percent	0.0526	-0.1044*	0.0518
	(0.1724)	(0.0565)	(0.1534)
Asian percent	-0.4164***	0.1569***	0.2595*
	(0.1534)	(0.0293)	(0.1353)
Hispanic percent	0.1933	-0.1122***	-0.0811
	(0.1343)	(0.0359)	(0.1193)
Unemployment rate	-0.6463***	-0.0540	0.7004***
	(0.1662)	(0.0441)	(0.1534)
Constant	4.020	-0.5301	-3.490
	(3.7505)	(0.9866)	(3.289)
Observations	~2000	~2000	~2000
R-squared	0.5647	0.5790	0.5085
Year FE	YES	YES	YES

Table 4. Fixed Effects SDM using Annual Data 1980-2010

	(1) Births Growth	(2) Deaths Growth	(3) Continuers Growth
Direct Effects			
Local ownership	-0.0453***	0.0025	0.0439***
	(0.0106)	(0.0044)	(0.0097)
Local owned and micro	0.0405***	-0.0019	-0.0412***
	(0.0094)	(0.0037)	(0.0087)
Local owned and noncore	0.0515***	-0.0040	-0.0485***
	(0.0091)	(0.0036)	(0.0084)
Standardized population	1.111***	-0.6390***	-0.4515**
	(0.2626)	(0.1434)	(0.1789)
Indirect Effects			
Local ownership	-0.1011	0.0116	0.0832
	(0.0668)	(0.0192)	(0.0620)
Local owned and micro	0.0489	-0.0077	-0.0394
	(0.0715)	(0.0209)	(0.0701)
Local owned and noncore	0.0653	-0.0047	-0.0591
	(0.0623)	(0.0172)	(0.0571)
Standardized population	7.139***	-0.3138	-5.953***
	(1.675)	(0.3591)	(1.4541)
Total Effects			
Local ownership	-0.1464**	0.0141	0.1271*
	(0.0737)	(0.0204)	(0.0672)
Local owned and micro	0.0895	-0.0096	-0.0806
	(0.0784)	(0.0229)	(0.0764)
Local owned and noncore	0.1167*	-0.0087	-0.1077*
	(0.0684)	(0.0184)	(0.0623)
Standardized population	8.250***	-0.9528**	-6.404***
	(1.757)	(0.4049)	(1.5119)
Observations	~15,000	~15,000	~15,000
Year FE	YES	YES	YES
H_0: $WX = 0$	χ^2 (4) = 12.96***	χ^2 (4) = 1.91	χ^2 (4) = 14.22***
H_0: $WX = -\rho X$	χ^2 (4) = 19.73***	χ^2 (4) = 1.64	χ^2 (4) = 19.57***

Robust standard errors in parentheses

*** $p<0.01$, ** $p<0.05$, * $p<0.1$

APPENDIX

Table A1. Births Growth Fixed Effects SDM Using Annual Data 1980-2010

	(1)	(2)	(3)	(4)	(5)
	Coefficients		Marginal Effects		
	X	WX	Direct	Indirect	Total
Local ownership	-0.0910***	-0.0493	-0.1227***	-0.4852**	-0.6079**
	(0.0332)	(0.0577)	(0.0385)	(0.2174)	(0.2396)
Local owned and micro	0.0863***	-0.0344	0.0938***	0.1397	0.2335
	(0.0232)	(0.0550)	(0.0296)	(0.2123)	(0.2349)
Local owned and noncore	0.1141***	-0.0459	0.1251***	0.1727	0.2977
	(0.0278)	(0.0535)	(0.0300)	(0.1905)	(0.2090)
Standardized population	1.925***	2.891*	3.149***	18.00**	21.15**
	(0.5775)	(1.5781)	(0.9410)	(7.9489)	(8.7028)
Bachelor's degree percent	0.5266***	0.0169	0.6180***	1.722**	2.340***
	(0.1192)	(0.1639)	(0.1490)	(0.7781)	(0.8653)
Poverty percent	0.4005**	-0.3448	0.3933**	-0.1332	0.2601
	(0.1737)	(0.2152)	(0.1569)	(0.4745)	(0.4601)
Black percent	0.2448**	-0.3603*	0.1931	-0.7820	-0.5889
	(0.1072)	(0.2025)	(0.1204)	(0.7711)	(0.8477)
Asian percent	-0.2744	0.1812	-0.3024	-0.0925	-0.3949
	(0.2191)	(0.2855)	(0.2026)	(0.6981)	(0.7076)
Hispanic percent	0.0083	0.0044	0.0227	-0.0095	0.0132
	(0.1626)	(0.2247)	(0.1369)	(0.5807)	(0.6044)
Unemployment rate	-0.3700**	0.1306	-0.4141**	-0.6627	-1.077
	(0.1808)	(0.2539)	(0.1761)	(0.6809)	(0.6670)
ρ	0.7699***				
	(0.0232)				
Observations	~2000				
R-squared	0.1771		$H_0: WX = 0$	χ^2 (4) = 12.96***	
Year FE	YES		$H_0: WX = -\rho X$	χ^2 (4) = 19.73***	

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table A2. Deaths Growth Fixed Effects SDM Using Annual Data 1980-2010

	(1)	(2)	(3)	(4)	(5)
	Coefficients		Marginal Effects		
	X	WX	Direct	Indirect	Total
Local ownership	0.0106	0.0350*	0.0158	0.0800**	0.0959**
	(0.0100)	(0.0200)	(0.0102)	(0.0353)	(0.0389)
Local owned and micro	-0.0019	-0.0257	-0.0057	-0.0500	-0.0557
	(0.0073)	(0.0202)	(0.0076)	(0.0366)	(0.0409)
Local owned and noncore	-0.0054	-0.0242	-0.0088	-0.0520	-0.0608
	(0.0085)	(0.0194)	(0.0085)	(0.0351)	(0.0395)
Standardized population	-0.2540	-0.2537	-0.2890	-0.8160	-1.1050
	(0.2526)	(0.4350)	(0.2869)	(0.8963)	(1.0268)
Bachelor's degree percent	-0.1724***	-0.0271	-0.1950***	-0.2310**	-0.4260***
	(0.0436)	(0.0556)	(0.0480)	(0.1095)	(0.1310)
Poverty percent	0.0077	0.0345	0.0134	0.0799	0.0934
	(0.0476)	(0.0528)	(0.0435)	(0.0680)	(0.0649)
Black percent	-0.0817	0.0156	-0.0845	-0.0848	-0.1692
	(0.0570)	(0.0966)	(0.0539)	(0.1577)	(0.1695)
Asian percent	0.0702	0.0205	0.0716*	0.1236	0.1952***
	(0.0514)	(0.0682)	(0.0433)	(0.0876)	(0.0705)
Hispanic percent	-0.0468	-0.0357	-0.0519	-0.1305	-0.1824*
	(0.0522)	(0.0765)	(0.0402)	(0.1126)	(0.1040)
Unemployment rate	-0.0709	0.0666	-0.0692	0.0526	-0.0167
	(0.0600)	(0.0701)	(0.0627)	(0.1070)	(0.1068)
ρ	0.5307***				
	(0.0281)				
Observations	~2000				
R-squared	0.1595		$H_0: WX = 0$	χ^2 (4) = 43.83***	
Year FE	YES		$H_0: WX = -\rho X$	χ^2 (4) = 41.24***	

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A3. Continuers Growth Fixed Effects SDM Using Annual Data 1980-2010

	(1)	(2)	(3)	(4)	(5)
	Coefficients		Marginal Effects		
	X	Wx	Direct	Indirect	Total
Local ownership	0.0819***	0.0399	0.1081***	0.3914**	0.4995**
	(0.0293)	(0.0551)	(0.0335)	(0.1976)	(0.2160)
Local owned and micro	-0.0860***	0.0463	-0.0914***	-0.0582	-0.1496
	(0.0201)	(0.0524)	(0.0253)	(0.1889)	(0.2079)
Local owned and noncore	-0.1092***	0.0525	-0.1167***	-0.1084	-0.2251
	(0.0243)	(0.0515)	(0.0262)	(0.1762)	(0.1921)
Standardized population	-1.667***	-3.136**	-2.757***	-16.98**	-19.74***
	(0.5328)	(1.406)	(0.8513)	(6.6259)	(7.307)
Bachelor's degree percent	-0.3773***	-0.0696	-0.4903***	-1.388**	-1.878***
	(0.1127)	(0.1501)	(0.1389)	(0.6377)	(0.7188)
Poverty percent	-0.4134***	0.3397*	-0.4031***	0.1136	-0.2895
	(0.1602)	(0.2049)	(0.1438)	(0.4287)	(0.4054)
Black percent	-0.1694	0.2860	-0.1351	0.4904	0.3553
	(0.1071)	(0.2086)	(0.1124)	(0.6910)	(0.7482)
Asian percent	0.2018	-0.1493	0.1862	0.0345	0.2206
	(0.1905)	(0.2476)	(0.1768)	(0.5828)	(0.5874)
Hispanic percent	0.0359	-0.0035	0.0523	0.0506	0.1029
	(0.1461)	(0.2068)	(0.1208)	(0.5164)	(0.5317)
Unemployment rate	0.4431**	-0.2099	0.4730***	0.4500	0.9230
	(0.1828)	(0.2463)	(0.1793)	(0.6389)	(0.6293)
ρ	0.7572***				
	(0.0234)				
Observations	~2000				
R-squared	0.1536		$H_0: WX = 0$	χ^2 (4) = 44.04***	
Year FE	YES		$H_0: WX = -\rho X$	χ^2 (4) = 42.05***	

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1